

Derivative Practice

Find the derivative of the following functions.

1. $y = (x^2 + 4x + 6)^5$

2. $y = \tan(3x)$

3. $y = \tan^2(x^3)$

4. $y = \cos(\tan x)$

5. $y = e^{\sqrt{x}}$

6. $y = \sin(e^x)$

7. $y = 5^{\frac{-1}{x}}$

8. $y = xe^{-x^2}$

9. $y = e^{-5x} \cos(3x)$

10. $g(t) = e^{t \cos t}$

11. $y = \sqrt{s^3 + 1}(s^2 + 1)^4$

12. $s(y) = \left(\frac{y-6}{y+7}\right)^3$

13. $f(x) = \ln(e^{3x} + 3)$

Answers to Derivative Practice

1. $y' = 5(x^2 + 4x + 6)^4(2x + 4)$

2. $y' = \frac{1}{\cos^2(3x)} \cdot 3 \quad (= 3 \sec^2(3x))$

3. $y' = 2(\tan(x^3)) \frac{1}{\cos^2(x^3)} 3x^2 \quad (= 6x^2 \tan(x^3) \sec^2(x^3))$

4. $y' = -\sin(\tan x) \frac{1}{\cos^2 x} \quad (= -\sin(\tan x) \sec^2 x)$

5. $y' = e^{\sqrt{x}} \left(\frac{1}{2} x^{-1/2} \right) \quad \left(= \frac{e^{\sqrt{x}}}{2\sqrt{x}} \right)$

6. $y' = \cos(e^x) \cdot e^x$

7. $y' = \ln 5 \cdot 5^{\frac{-1}{x}} \cdot x^{-2} \quad \left(= \frac{\ln 5 \cdot 5^{\frac{-1}{x}}}{x^2} \right)$

8. $y' = e^{-x^2} + xe^{-x^2}(-2x) \quad (= e^{-x^2} - 2x^2 e^{-x^2})$

9. $y' = e^{-5x}(-5) \cos 3x + e^{-5x}(-\sin(3x) \cdot 3) \quad (= -5e^{-5x} \cos 3x - 3e^{-5x} \sin(3x))$

10. $g'(t) = e^{x \cos x}(\cos x + x(-\sin x)) \quad (= e^{x \cos x}(\cos x - x \sin x))$

11. $y' = \frac{1}{2}(s^3 + 1)^{-1/2} \cdot 3s^2(s^2 + 1)^4 + \sqrt{s^3 + 1} \cdot 4(s^2 + 1)^3 \cdot 2s$

12. $s'(y) = 3 \left(\frac{y-6}{y+7} \right)^2 \left(\frac{(y+7) - (y-6)}{(y+7)^2} \right)$

13. $f'(x) = \frac{1}{(e^{3x} + 3)} \cdot e^{3x} \cdot 3 \quad \left(= \frac{3e^{3x}}{(e^{3x} + 3)} \right)$